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for Zanzibar. Pögge calculates that his journey to the Lubilash and back to Mukenge will take six months.

African Exploration.—The Royal Geographical Society has decided to send a new exploring expedition to Africa under the command of Mr. Joseph Thomson. After organizing his company at Zanzibar, Mr. Thomson will proceed from Mombas on the East African coast to Mount Kilimandjaro, and after ascending this celebrated peak, he hopes to advance through an entirely unknown region to the shores of the Victoria Nyanza, returning to the coast by a more northerly route so as to visit, if practicable, Lake Baringo and Mount Kenia.

Lieutenant Giraud, a young French naval officer, has sailed from Marseilles for Zanzibar. He intends to go either to Lake Tanganyika, or more probably by the north shore of Lake Nyassa, to the Chambeze River. He will follow this stream to its outlet in Lake Bangweolo, which he proposes to circumnavigate. He then hopes to descend the Lualaba-Congo to the sea.

The French Government has decided against the scheme of M. Roudaire of flooding a portion of the Sahara, considering that the cost will exceed the advantages to be gained.

Professor Guido Cora in an address before the Italian Geographical Society, describes the Desert of Sahara as an immense tract of country, with a mean elevation of from 1300 to 1650 feet above the level of the sea, in which sand does not occupy more than one-fifth of the entire area, and where large chains of mountains are found attaining a height of from 6550 feet to 8200 feet. In some parts it only rains once in some twenty years, while in others there is a regular rainy season; the temperature there rises to 122° F. and falls to 19° 4′ F., and the loftiest mountain tops are covered with snow and ice for several months in the year. The fauna and flora have a special importance. Lastly, the Sahara has a population of some 3,000,000, and contains towns of from 5000 to 10,000 inhabitants. It has a total area of 3,700,000 square miles, stretching on the north to the Great Atlas and the Mediterranean, between the two Syrtes to the south of Cyrenaica and Lower Egypt; on the east it is conterminous with the Valley of the Nile; on the south it is bounded by a line running from El Obeid to Lake Chad, to the middle course of the Niger, and the lower part of the Senegal; and lastly, on the west it reaches the Atlantic Ocean.

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MICROSCOPY.[1]

Taylor's Freezing Microtome.—All who are familiar with the exquisite sections of soft tissues, sometimes cut by the various freezing microtomes, and at the same time have had experience of the troubles, uncertainties and delays (if not dangers) of pack-

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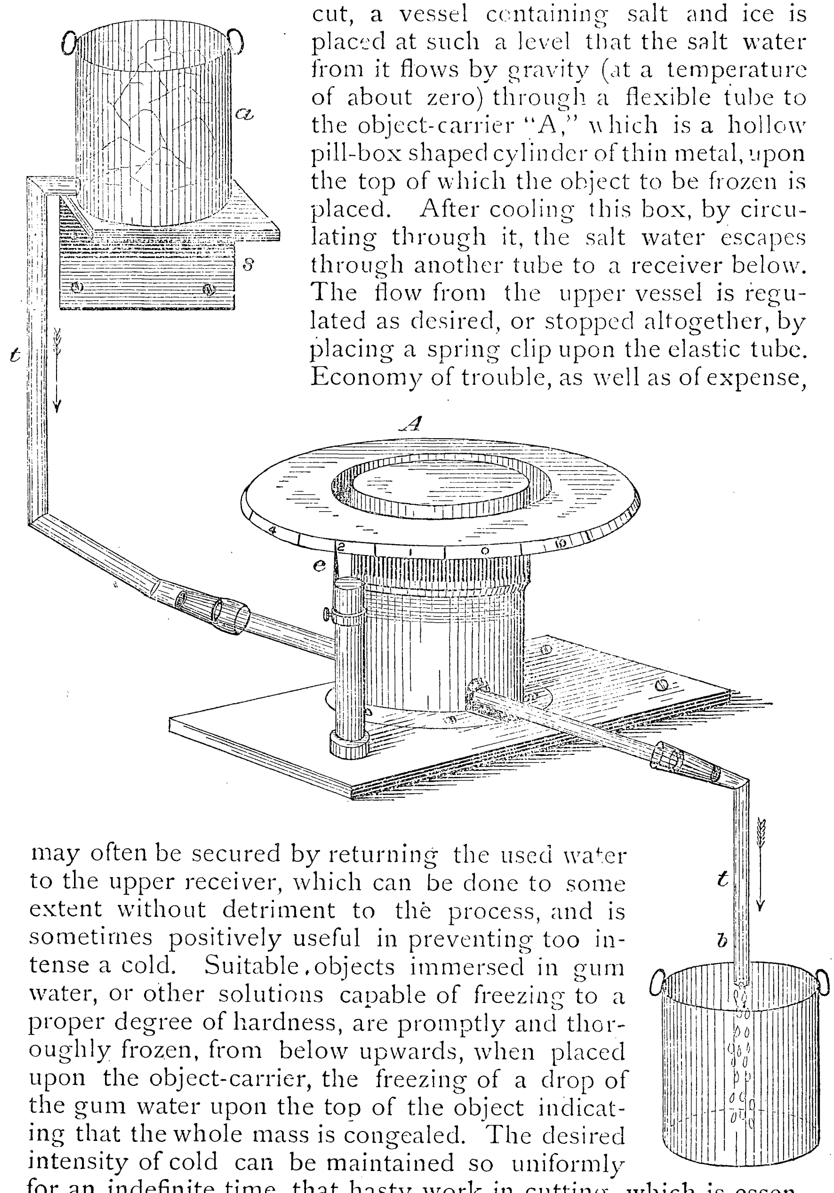
[1] This department is edited by Dr. R. H. Ward, Troy, N. Y.



ing ice and salt in little spaces close to the object, or pumping the spray of rhigolene or ether, will be glad to welcome a contrivance fitted to give the best results in cutting frozen tissues with uniformity, certainty and ease. The microtome recently contrived by Thomas Taylor, M.D., of the Department of Agriculture, at Washington, seems able to accomplish this. As shown by the cut, a vessel containing salt and ice is placed at such a level that the salt water from it flows by gravity (at a temperature of about zero) through a flexible tube to the object-carrier "A," which is a hollow pill-box shaped cylinder of thin metal, upon the top of which the object to be frozen is placed. After cooling this box, by circulating through it, the salt water escapes through another tube to a receiver below. The flow from the upper vessel is regulated as desired, or stopped altogether, by placing a spring clip upon the elastic tube. Economy of trouble, as well as of expense, may often be secured by returning the used water to the upper receiver, which can be done to some extent without detriment to the process, and is sometimes positively useful in preventing too intense a cold. Suitable objects immersed in gum water, or other solutions capable of freezing to a proper degree of hardness, are promptly and thoroughly frozen, from below upwards, when placed upon the object-carrier, the freezing of a drop of the gum water upon the top of the object indicating that the whole mass is congealed. The desired intensity of cold can be maintained so uniformly for an indefinite time, that hasty work in cutting, which is essential to the best work of many freezing microtomes, and the characteristic advantage of some of the best of them, is not required. The cutting knife is supported upon a circular plate, which screws up and down around the object, the extent of its motion, and the consequent thickness of the section to be cut, being indicated by a pointer near its graduated edge. The best of workmanship is required in this screw, but it can be made so firm and yet so easy as to give excellent work. It is evident that the Biscoe form of knife-carrier could be easily adapted to this instrument by those who prefer it. The standard size of the instrument cuts sections up to one inch wide, and costs $15.00, or with rubber tubes, clips and tin pail, $15.50. A special size is being made for cutting much larger sections, which will probably cost about $20 00. The instruments can be obtained from A. R. Taylor, 328 Massachusetts avenue, Capitol Hill, Washington, D. C.

RELATION OF APERTURE AND POWER.—In the Journal of the Royal Microscopical Society, Professor Abbe gives an elaborate and exhaustive mathematical demonstration of the apertures useful for various powers. His conclusions favor extreme angles for high powers, economy of aperture for medium powers (the loss of penetration, working distance, &c., in superabundant aperture being always a disadvantage greater than the possible benefit), and considerable latitude for low powers, where a surplus aperture of 100 per cent. higher than that required for delineation, may be useful for illumination. A similarly conservative position was taken by Dr. Wm. B. Carpenter, in his able and highly appreciated address on the subject, at the Montreal meeting of the A. A A. S. He preferred moderate angles for most purposes, even for high powers, and wholly condemned the fashion of attempting, by unduly high angle, to force a low power objective to do the work of a high one. Such a lens will resolve tests, but its use is trying to the eyes. It is useless to spoil a good one inch by trying to make it a poor one-fourth. On the other hand, Mr. Geo. E. Davis, in a lengthy editorial in the *Northern Microscopist*, urges the use of much higher angles than would be admitted by Professor Abbe's theories, and he would only select low angles when cheapness was obligatory. His ideal series is a 2 inch of 20° or more; a 1 inch of 35° or 40°, with a working distance of 0.40 inch; a ½ inch of 66° or 70°, working distance 0.10 or 0.12 inch; a ¼ inch of 100°, and higher powers as required. He claims that objectives by Tolles, Beck, Ross, and Wray, stand reduction of aperture by means of the iris diaphragm shutter remarkably well, though those of Zeiss, made from the formulas of Professor Abbe, do not. (Conf. discussion at Manchester, Mic. Soc., in the *Northern Microscopist*, Vol. 2, pp. 284-291.)

VISIBILITY OF FINE RULINGS.—Professor W. A. Rogers, in a paper before the A. A. A. S. considers Mr. Fasoldt first in the art of micrometric ruling, since the death of Nobert; but his plates as high as 100,000 to the inch, have not been photographed, and the resolution of 152,000 to the inch, though believed by some, has not been proven. Single lines $\frac{1}{50000}$ of an inch wide are readily seen by the naked eye, and those one-third as wide may be seen without the microscope. Lines too fine to be seen singly with the microscope can be seen and resolved if ruled close together in bands.

Cutting Sections of Coal.—The discussion in the English journals as to the correctness of the assertion in the Micrographic dictionary, that coal can be softened by soaking in a solution of carbonate of potash, sufficiently to be sliced with a razor, has ended with the concession that it is lignite, and not coal, that can be so prepared. The use in the dictionary of the word coal, in this special and not usual sense, has caused many and perplexing failures to experienced workers as well as to beginners.

Microscopical Diagnosis.—Under this title, Professor Charles H. Stowell, of the university of Michigan, has brought out an octavo volume of 250 pages. The book, which is published by Geo. S. Davis, of Detroit, at $3.00, is well printed and freely illustrated with wood cuts and lithographs. Its character is not well indicated by its name. It consists of a collection of essays upon a variety of subjects, having in many cases little relation to each other, and no special connection with the technical subject announced in the title. Part I, of 93 pages, relates (with the exception of the chapter on starch, which seems to belong to Part II) to medical microscopy, with especial reference to questions of diagnosis. It is the portion which gives name to the book, and after an introductory chapter on the instrument, treats of blood, epithelium, sputa, etc., muscle, urinary deposits, parasitic diseases of the skin, tumors, starch, and staining of blood. The chapters upon urinary deposits and tumors are particularly full, the former being illustrated by eight lithographs, very carefully and accurately drawn by Mrs. Stowell. Part II, of 118 pages, is a series of excellent studies in vegetable histology by Mrs. Stowell, the objects selected being of medicinal or economical importance, and the observations having frequent reference to the question of adulterations. By far the most prominent and interesting portion of this Part, is the "Study of Wheat," reprinted from the *American Miller*. The other chapters of this part relate mostly to medicinal plants, and were originally produced in various journals. When supplemented, as proposed by Mrs. Stowell, by a series of similar studies of the more important medicinal plants, this collection will become a treatise of great importance and interest. Part III is the series of very instructive and popular papers on the preparation and mounting of microscopic objects, originally published by Wm. H. Walmsley in *The Microscope.* It forms a convenient appendix to the volume.

THE HOUSE-FLY AS A CARRIER OF CONTAGION.—This subject, which has attracted some attention of late, was discussed by Dr. Thomas Taylor, of Washington, at the Montreal meeting of the A. A. A. S. Having noticed a species of anguillula within the proboscis and abdomen of dissected flies, he undertook a series of experiments to determine whether the house-fly might not be a carrier and distributor of germinal virus of various kinds. The suction tube of the fly was found by measurement to be of sufficient diameter to admit of taking up the spores of cryptogams, trichina, the eggs of anguillula, or even the anguillula themselves. Thirteen specimens of anguillula were found in the proboscis of a single house fly, and sixteen acari in the thorax of another. Furthermore, flies fed with the spores of the red rust of grasses, mixed with sugar, swallowed it freely, and also carried about the spores attached to the hairs on their limbs. The fact that by far the greater part of the spores were consumed, and digested without germinating, suggested to the author that the flies might thus be destroyers of microscopic germs as well as disseminators of them. Dr. Leidy made similar observations some years ago.

RECENT MICROSCOPICAL PAPERS :—

Micro-organisms from Rainwater, Ice, and Hail. (Discussing the question of Bacteria in the air and as a cause of disease.) R. L. Maddox, M.D., in *Journ. Royal Mic. Soc.*, Vol. II, p. 449.

Simple method of determining Angular Aperture. Ernst Gundlach, in *Am. Month. Mic. Journ.* Vol. III, p. 176.

Development of the Planula of *Clava leptostyla* Ag. J. H. Pillsbury (Montreal Meeting A. A. A. S.), in *do.* p. 181.

A New Thericola. Dr. A. C. Stokes, in *do.* p. 182.

The Microspectroscope. Romyn Hitchcock (at N. Y. Mic. Soc.), in *do.* p. 183.

New Constant Pressure Injection Apparatus. Professor Wm. Libby, Jr. (at A. A. A. S.), in *do.* p. 187.

Physiology of Variable Apparent Magnification by the Microscope. W. LeConte Stevens (at A. A. A. S.), in *do.* p. 189.

Some Vegetable Poisons. (Observations and Experiments in regard to Bacteria in poisonous plants). Professor T. J. Barrill (at A. A. A. S) in *do.* p. 192.

Proboscis and Labial Palps of the Oyster. H. J. Rice, in *The Microscope*, Vol. II, p. 117.

Occurrence of Red Snow in Hertfordshire. R. B. Croft, R. N., in *North. Microscopist*, Vol. II, p. 249.

Life Histories and their Lessons. Rev. W. H. Dallinger, in *do.* p. 263.

Spiders; their Structure and Habits. William Horner, in *Journ. Postal Mic. Soc.*, Vol. I, p. 63, etc.

Photo-micrography. (Popular description of apparatus and methods.) Harry Barker, in *do* p. 75.

Foraminifera; How to Prepare. Charles Elcock, in *do.* p. 25 and 139.

Œtiology of Tuberculosis. (A full and excellent summary of Koch's observations and experiments upon the Bacteria of tuberculous disease.) Wm. F. Whitney, M.D., 16 pp., Cambridge, 1882. Reprinted from *Boston Med. and Surg. Journ.*

Communicable Diseases. (A popular account of the germ theory of disease. Geo. E. Blackham, M. D., in *The Bistoury*, 1882, p. 163.

Alternation of Generations among the Uredines. Charles B. Plowright, in *Sci. Gossip*, 1882, p. 196.